

HOW IS
THE
CHOLERA PROPAGATED?

THE QUESTION CONSIDERED,

AND

SOME FACTS STATED.

BY AN AMERICAN PHYSICIAN.

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HOW IS THE CHOLERA PROPAGATED?

THE history of most of our epidemic diseases, it must be acknowledged, is but a record of the extent of their ravages, and the horrors which follow in their train, with some of the phenomena which accompany them. We search in vain through the most faithful of such records, ancient and modern, for the laws that govern their coming and going; and even, at the present day, when our researches have been so far extended into physical nature, it is best for us to confess that we still know but little of their origin and mode of propagation.

That it is a subject of the most momentous inquiry, and well deserving the attention of men of observation, the appearance of so fearful a disease as the Asiatic Cholera in England, after having invaded, in its fatal march, so many empires, and called forth so much speculation, sufficiently attests. Whence originated this fearful disease?

and how is it propagated? are problems which medical men are called upon to solve, and in which humanity has the deepest concern. The writer of these observations has never seen the disease as described by those who have watched its progress in Asia, and since it came into Europe; but his observations upon many of the diseases of America, generally believed to be communicable, and attended with a mortality not less than Cholera, induces him to record some of the facts ascertained, in the hope that they may prove useful at the present time, and lead to a stricter scrutiny into the cause and prevention of this fatal malady.

It will not be pretended, that there is any parallel between a disease which has extended itself over so many degrees of latitude, through the snows of winter, and the heats of summer, and one which comes after the vernal equinox, and is invariably checked by the first frost of autumn; yet it may be equally true, that their mode of propagation, when the cause is in activity, is the same.

According to the opinions of the earlier writers on the epidemic Yellow Fever of the West Indies, the disease was looked upon as of African origin, and as being communicable from body to body in an eminent degree. This view of the case, so

afflicting to humanity, prevailed for a long time, and has only given way after the closest examination, and upon the recorded testimony of so many able and ingenious men who have watched the origin and progress of the disease, and have taken a more enlightened view of the subject. At the present time, while nineteen-twentieths of the medical observers on the other side of the Atlantic have abandoned the idea of contagion, or the communicable nature of this disease from one body to another, and have gradually yielded to the testimony of their countrymen, who annually observe its progress on the Atlantic border, or on the banks of the Mississippi; few European philosophers have changed their views with regard to its contagious nature, and everywhere quarantine regulations are instituted to prevent its importation. With all the intercourse which England has had, since this disease was first observed in her possessions beyond seas in three quarters of the globe, (and how mortally her able writers have well described,) the fact of its importation and propagation at home, extended as her commerce has been, is unknown. At the same time, in the South of Europe, and upon the shores of the Mediterranean, where quarantine laws are excessive

in rigour and preserved at the point of the bayonet, the disease has often appeared, and with the same malignancy which sometimes marks its progress in America. How shall we reconcile facts so contradictory to the laws which we know to govern in those diseases which are strictly communicable or contagious? The Small Pox, unknown in America at the period of its discovery, was carried there, and has spread itself over the whole continent at different times, from the hut of the Esquimaux at the icy cape, to the miserable natives of the Terra del Fuego. It is strictly a communicable disease, and the laws which govern its progress are well understood. Can the same be said of the Cholera or Yellow Fever? I apprehend not, at least in the present state of our knowledge; for, although it is certain that each of these diseases is propagated from one place to another, it may well be doubted whether they pass from one body to another, or through the medium of those morbid secretions of the human system which preserve and multiply the sources of infection in contagious diseases. This is the great and interesting subject of inquiry; and I shall proceed to state for consideration, at a time when the country is threatened with so dreadful a scourge as the Asiatic Cholera, some of the obser-

vations I have made upon the propagation of the great and fatal epidemic of America.

There are so many evidences of the causes of fatal fevers originating under certain conditions of the atmosphere, in all parts of our globe, and disseminated through the air, sometimes slowly, and sometimes rapidly, over vast regions,—the disease appearing in the same type at different places, with greater or less mortality,—that the fact may now be considered as well established. The medical history of England abounds with interesting matter upon this subject. That the Plague, Yellow Fever, and perhaps the Asiatic Cholera, thus originate and are disseminated, is very probable; for these diseases, if they were communicable, like Small Pox, and capable of being multiplied like it, through the morbid secretions of the body, would long since have visited the four quarters of our earth with the most awful destruction of the human family. That infectious diseases, in their progress, obey very different laws, is, however, evident from the well recorded testimony we possess, of their manner of appearance and disappearance. They are all the endemics of certain latitudes; but sometimes change their characters, and become epidemic, and very mortal in their course. The Yellow Fever of America, it is

well known, prevails annually, between the months of May and November, in the Antilles, and on the Continent, from the Gulph of Mexico to Cape St. Roque. At Havanna, on the Mississippi, at Vera Cruz, and on the Orinoco, it is the same disease, with the same symptoms ; obeying the same laws ; varying in intensity at different periods, — one year very malignant, and the next comparatively mild. That it is produced from a gaseous emanation, the origin and force of which is regulated in a peculiar manner by temperature, is now well understood. The interesting fact stated by Humboldt, that the *vomito* never appears upon the table lands of Mexico ; and what is strictly in accordance with the observation of every one, that the disease comes with the heat of summer, and vanishes with the first frosts of autumn, are corroborative of what I have stated,—that the cause of this disease is gaseous, and is propagated through the common atmosphere we respire.

It is reasonable to believe, that most of the formidable diseases to which we are subject are received through the respiratory organs ; and there are some facts connected with the propagation in this way, of the formidable fever of which we are speaking, that are very interesting. It has been observed, that persons sleeping in the lower parts of houses,

or in the open air, are more liable to take it than those who occupy the more elevated apartments ; and those who are cautious of exposure to the night air are also less liable to the disease than others. Vessels lading at the wharfs of cities where the atmosphere has been known to be much charged, have taken it with them to distant climes ; and although the captains and crews have not fallen victims to the disease, yet upon the cargoes being discharged in other ports, persons newly exposed have taken the disease ; and, in a climate favouring its propagation, whole towns have occasionally become infected, and great mortality ensued. When, from the heat of climate and condition of the atmosphere, the poison of this disease is generated or introduced, germs are diffused as if from a common centre, and thus the infection radiates, tainting the air in every direction ; but it is found invariably to lessen in intensity, the more it becomes diffused. The first cases, in all epidemics of this description, are usually the most fatal ; and where the infected air has been pent up in narrow and confined streets, the disease has often been observed to spread in a direction corresponding with the currents of air. A knowledge of this fact has led to the immediate removal of the citizens, and the boarding up of

those streets in which the pestilential air is known to exist. A great portion of the population of the city of Baltimore was thus saved in the year 1819, when this disease appeared in that city in a mortal form. Another fact in regard to the mode by which this disease is propagated, is now well known to the commanders of vessels of war. It is, that almost invariably where ships are moored in a direction to catch the land breeze of the Tropics, particularly in the vicinity of towns, the most fatal effects result. A frigate, which was thus exposed at Port au Prince, St. Domingo, in the year 1823, the crew of which, on her arrival, were perfectly healthy, lost one-third of her men; and, upon returning to port, infected many who respired the air of her interior. The succeeding year, another remarkable instance was presented in the case of a sloop-of-war and store ship which came into port from the West Indies. The officers and men, engaged in breaking bulk in both of these vessels, were taken with malignant Yellow Fever, and most of them died. All commanders acknowledge the difficulty with which the change of an impure atmosphere on ship-board is effected, — the resort to wind-sails and other means has not always proved available. Fortunately, the discovery of chlorine

in its combinations with lime or soda furnishes a convenient, and, it is believed, an effective agent through which the miasmata producing fever are decomposed, or rendered harmless. The author formerly communicated to government the result of his observations upon the manner in which the Yellow Fever was propagated, and has since derived great satisfaction from the complete success which has attended modes of prevention then pointed out. It is melancholy to reflect, that a loss of many valuable lives has attended the efforts to suppress piracy in the West Indies, from want of knowledge of a fact so simple as that above stated. At the present time, ships of war of the first class visit these islands during a prevalence of the epidemic fever; but by keeping out of port, (though they hold constant communication with the shore by means of boats,) and by attention to cleanliness and the free use of chloride of soda, they are preserved, during the most sickly seasons, in a perfectly healthy condition. How the exhalations so noxious and fatal to human life are generated, it is best at once to say, we are perfectly ignorant; *causa latet, vis est notissima* is perfectly applicable here; and, without entering into any theory or

speculation upon this interesting subject, my whole aim is to direct the attention of the medical profession, at the present important crisis, to a strict observation of the manner in which the Asiatic Cholera is disseminated; for upon this correct knowledge must depend all preventive means and the safety of the population. It may be a disease communicable from body to body, and obeying, like Small Pox, all the laws of a contagious disease; but it has occurred to the writer, from what he has read upon the subject, that Cholera, like Yellow Fever, has in truth no common attribute of a disease strictly contagious, and that we must look for some other solution of the manner in which its germs, so fatal to life, are produced and sown.

It is evident that no chemical combination exists between our atmosphere and the miasmata of which we have been speaking, but it would appear, that they are received and held in solution, and thus diffused, sometimes very extensively, and, in the instances of Yellow Fever and Plague, would often be much more so, were it not that the infecting miasmata are specifically heavier than the atmospheric air. It has been a question with naturalists to what extent the pollen of plants is active when conveyed by the atmosphere;—that there is a limit

to this activity, in both cases, there can be no doubt; for the more extended the diffusion, as before observed, the less the activity and power of infection. An early removal of the population from the sources of infection, and an immediate interdiction of the healthy from diseased parts of a town, are of the first importance in arresting many of our epidemic diseases; and, should the Asiatic Cholera prove thus communicable from one to another, will be the only efficacious means which can be resorted to, and by which we can arrest its course, or prevent its communication through the foul air of vessels coming from infected ports. The contagious nature of this disease has been rather hastily inferred from the fact of its following, both in Asia and Europe, the great rivers and masses of population; for it accords with observations both of ancient and modern times, that many diseases, such even as are not ranked as contagious, are diffused over Continents in a direction contrary to the currents of air, and with a certainty which defies all human means to avert or arrest, and that these diseases are generally mild when extensively diffused, and become malignant when the cause is concentrated. Now, it is not difficult to conceive that a concentration of the cause of Cholera producing its malig-

nant form, should take place in camps or in the crowded or ill ventilated portions of cities, generally inhabited by the poorer part of the population, and that in this concentrated form it should be carried along the courses of rivers in vessels, or over the highways of nations. What medical man is there who does not know the fatal effects of confining any quantity of diseased persons to narrow and ill-ventilated apartments? Yet, will this be called contagion? Small Pox produces its impression fully wherever taken, and multiplies itself. Not so with jail or hospital fever, which we all know to be infectious only at the source whence it emanates, or through clothes which have not been properly ventilated. That all the gases which poison the sources of life through the lungs, obey particular laws, which are modified by temperature, appears very certain. I might instance the generation of the cause of Yellow Fever at a continued temperature over 80° , and the entire loss of its activity when the thermometer is low enough to occasion frost. It has been observed of the epidemic Influenzas of the United States of North America, that they originate in the Autumn on the borders of the great Lakes, and after passing over the Continent in a direction parallel with the sea, with a

certainly the most extraordinary, disappear in the milder climate of the Gulph of Mexico, or are lost in the boundless forests beyond the Mississippi. The Influenza, in its course, rarely spares any of the population, but is seldom fatal, except in cases of old people. So regular is its march, that its appearance in one town is the certain signal of the next becoming afflicted with it, and sooner or later, according to the distance which separates them. The singular appearance, also, a few years ago, in the Antilles, of a fever with rheumatic symptoms, familiarly called the Dangué, which, after passing through the islands, visited the coast on the Gulph of Mexico, and extended itself from the sea to the mountains, and as far north as the Capes of the Chesapeake, is another instance. The universal diffusion of this disease was so remarkable, that few, or none of the population escaped in those regions through which it extended. It was communicated through the atmosphere, and appeared capable of being propagated only where the climate was regulated by a certain degree of temperature, for no restrictions whatever were imposed upon intercourse of the population from south to north. This disease was believed to be highly contagious, and in the West Indies, where it first appeared, was declared to be

imported, as all bad things are, from Africa.

Not only does temperature influence these causes of fever, but it is equally certain, that their deleterious character may be often changed or modified through the general use of certain articles of fuel, as bituminous coals, &c. A most remarkable evidence of this fact occurred upon the Mississippi in the years 1821—22. Such was the mortality which, during those years, prevailed in the city of New Orleans, and so highly infected was the atmosphere of that city, that the ships and steam-boats which left the wharfs with passengers, often lost many on board before reaching their places of destination. In one case, a steam-boat with passengers ascended the river, and, deserted by all who had the power to escape from her, was not visited until the returning Autumn brought a more salubrious atmosphere, when the bodies of those who had perished on board were found in a putrid state. It is worthy of remark, that during great mortalities, the Robert Fulton, a steam-ship, burning *coals*, continued to make her trips with no loss, from the fever, of those on board. It has been observed, that since the general use of coals in London, there has been a comparative decrease in mortality, and that Plague has been unknown. Can it be that Plague and Yellow Fever, diseases

similar in their characters, and communicable in the same way, but generating no specific virus, depend upon the same cause, and have a common origin? Is the Cholera a dissimilar disease, or does it depend upon a specific contagion for its propagation?

Too much stress has been laid by physicians upon the different forms and symptoms which diseases assume, in different climates, in determining their causes and origin. The records of the art afford abundant proof that, in the same country, at different seasons, various orders of parts are affected from the same common atmospherical cause, exhibiting different symptoms;—thus at one season, the serous membranes, at the next, the mucous. The cause of Yellow Fever generally invades the seat of life, through the sero-membranous structures, while that of Plague attacks the sero-mucous,—the mucous membrane of the gastro-enteric system is the seat of the fatal Cholera. The violence of the attack in these diseases being modified always by the intensity of the cause, and the condition of the body invaded.

It is objected to the atmospherical transmission of the infection of pestilential fevers that we do not see them becoming general, as in the more marked instances which we have noticed of the Influenza and Dangué, and extending to the whole

population. Our atmosphere, like other fluids, is capable of receiving, and without any change of its constituents, of transmitting other bodies ; the extent of transfusion must depend upon the greater or less facility with which the foreign body is taken up, and upon the greater density or rarity of the atmosphere itself. We know also that the presence or absence of both heat and light influences noxious exhalations and their dissemination through the air. We can thus readily account for the cause of the Yellow Fever never extending to the table lands of Mexico ; and we have somewhere read of a Padrè, in South America, who saved himself during the prevalence of a formidable malignant fever, by retiring at an early hour every day to his hammock, which was swung in the branches of one of the highest trees of the forest. The force of the causes producing malignant fevers would appear to be generally proportioned to their density and consequent difficulty of diffusion through our atmosphere.—This law is but another evidence of the wisdom which has provided for the preservation of our species ; for, were it otherwise, and did not the air act as a diluent, few would escape. In the American epidemic, the most malignant and fatal cases have occurred from persons going into houses in streets

which were infected, after the pestilence had subsided, and before they had been ventilated. The same remark, it is believed, has been made in other countries after malignant fevers have prevailed.

The difficulty attendant upon the removal of the people from that part of a city which becomes infected, is very great, and no doubt it has not escaped a board so able as that which now watches over the health of London, that it is best done by a very early warning to the inhabitants near the source of infection, and a subsequent exclusion and entire prohibition of the population from that part of the town. The poor are to be provided for, and, as it is much easier to do so in health than in sickness, should the infection reach the metropolis, the sooner they are removed from the streets in which it makes its appearance, the better. Much attention must be paid to clothing. In the Winter of 1815, a disease highly infectious, and unexampled for its mortality, broke out among a body of men who were quartered in a large stone building, and who were confined to it, except when on duty. It commenced in a corner of the house, and spread with rapidity. So prostrated were the powers of life in healthy vigorous young men under its attack, that in many cases, the first

paroxysm was mortal. Two-thirds of those taken died. The disease was completely arrested by changing the clothes, and putting the men into tents, although eighteen inches of snow then covered the ground.

If, indeed, Cholera depends upon a specific virus, and is communicated through contact, then it is not asserting too much to say, that all the cordons of troops in the world, with the most active and vigilant exercise of the power of the different Governments of Europe, will not prevent its extension ; for what disease have we been more interested in preventing the spread of, than the Small Pox, and has it not gone from the hut of the peasant to the palace of the prince, in every quarter of the earth ? But if, on the other hand, the germs of this disease, which, it is probable, can only be changed by a very high or low degree of temperature, are disseminated by means of the foul air of cities, which is carried from place to place by different modes of communication, then its mortality can be lessened, and the population of many nations saved, by the immediate removal, where the disease occurs, of those infected, to a more healthy atmosphere, and the exclusion of the other portions of the population from such infected places, until a thorough ventilation and cleansing,

through means of the chloride of soda or lime, can be fully effected. The fact that the removal of the population, and closing up of the infected streets, has often prevented the spread of Yellow Fever in the transatlantic cities, is worth a thousand theories on the subject.

In the foregoing pages, if a single hint which has been given should lead to a more correct knowledge of the origin and propagation of the fatal malady which now threatens this metropolis, the object of the writer will be fully attained. In conclusion, he would only remark, to those medical gentlemen who may have an opportunity of observing the disease, that it is necessary, for the attainment of truth, that we should lay aside the dogmas of the schools, and dispossess ourselves of all preconceived notions on either side of the question of contagion, or non-contagion, and not too hastily to make up our minds, or give opinions upon this subject. Let us attentively watch and diligently inquire into the causes and mode of propagation of this enemy of the human family in a new shape. The writer was once as firm a believer in the contagious nature of Yellow Fever as any advocate for the contagion

of Cholera can be, and his opinion was only changed by seeing that in a hospital, crowded with patients removed from the infected district of a city, no one, male or female, took the disease; when, at the same time, those who ventured to respire the air of the infected streets, even for a few hours, were seized with it, and died. Cannot the cause of Cholera, obeying, as I have before observed, a different law of temperature, be thus conveyed, and, when pent up in narrow and filthy streets, or disseminated to the ill ventilated apartments of the poor, become fatal to the population?

REMARKS
ON THE
CHOLERA MORBUS:

CONTAINING A DESCRIPTION OF THE DISEASE,

ITS

SYMPTOMS, CAUSES, AND TREATMENT,

TOGETHER WITH

SUGGESTIONS AS TO THE BEST MEANS OF GUARDING AGAINST ITS
ATTACK:

SUBMITTED TO THE ATTENTION

OF THE MEDICAL PROFESSION;

BUT DESIGNED PRINCIPALLY FOR THE

USE OF THE PUBLIC IN GENERAL.

BY H. YOUNG, M. D.

FORMERLY OF THE H. E. I. C. MEDICAL SERVICE IN BENGAL.

*Segnius irritant animos demissa per aurem,
Quàm quæ sunt oculis subjecta fidelibus, et quæ
Ipse sibi tradit spectator.*

HOR.

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MDCCCXXI.

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TO THE
CHAIRMAN, DEPUTY CHAIRMAN,
AND
DIRECTORS
OF THE
HONOURABLE EAST INDIA COMPANY,
THIS SHORT AND FAMILIAR
ACCOUNT OF THE
SPASMODIC CHOLERA OF INDIA,
IS RESPECTFULLY INSCRIBED,
BY
THEIR OBEDIENT SERVANT,
THE AUTHOR.



P R E F A C E.

THE following pages contain the substance of a short Treatise on the Epidemic Cholera, which was drawn up and transmitted to the Medical Board at St. Petersburg, in the early part of the present year, when the disease was committing great ravages in various parts of the Russian empire.

The author had preserved some of the notes and observations, which a very arduous and extensive practice in India, in this formidable disease, had afforded him the opportunity of making; but he never contemplated committing them to the press until the present period;

when, from its gradual approach towards our own shores, and from reports being propagated of its having already reached Hamburgh, the most painful apprehensions are felt regarding this fatal pestilence.

Under these circumstances, although he can claim no other merit than that of faithfully narrating what has fallen under his own immediate observation, he feels it a public duty to contribute his share to the stock of information already possessed on this interesting subject. So numerous, however, are the publications on Cholera, which have of late appeared, that he would still have hesitated as to the propriety of obtruding his observations on the public, were it not that he dissents from the opinions promulgated by the Board of Health, as to the contagious nature of the disease—opinions which, if acted on, may, by giving rise to unfounded, or, at least, exaggerated alarm on this point, occasion the defection of friends and relatives, at a moment when their kind offices are

of the utmost importance to the comfort of the patient, and when the absence of such affectionate attentions, by producing depression of mind, would materially diminish the chances of recovery.

Presuming the disease now so fatally prevalent in Europe, to be identical with the Indian Cholera, it will readily be admitted, that, at a moment like the present, it is desirable that the public be put in possession of every authentic account of that dreadful pestilence; and it is with the design of furnishing an additional document of that nature, that the author has ventured to publish the following pages, giving a concise description of its rise and progress, of the symptoms usually present, and of the method of treatment which was found, from experience, to be most successful. To these he has also added a few suggestions as to those precautionary measures which afford the greatest probability of averting the pestilence, or disarming it of some of its terrors; and

while he trusts that his remarks may be found not altogether devoid of interest to members of the profession, he earnestly hopes that they will prove, in an especial manner, useful to the community at large, serving the purpose of a safe and practical manual, to be referred to in situations where medical assistance is not immediately at hand. Such being his design, he has avoided technical expressions, and studiously foreborne to enter on hypothetical reasonings and theoretical discussions, as being quite foreign to the object he has had in view.

19, *Devonshire Place,*
London.

REMARKS
ON THE
CHOLERA MORBUS.

INTRODUCTORY OBSERVATIONS.

AT the present moment, when this country is in danger of being invaded by the Epidemic Cholera, it becomes the duty of every person practically acquainted with its history and symptoms, and with the most successful method of resisting its attack, to furnish all the information he possesses, and every suggestion that he thinks may be useful in an emergency so calculated to produce anxiety and alarm.

Under these impressions, the author of the following pages has been induced to collect together all the notes and memoranda in his possession, relative to the Cholera Morbus of India; not with the expectation of adding many new or important facts relating to this interesting subject, but with the hope that, by giving a faithful history of the nature and treatment of a disease which he has so often personally wit-

nessed, he may assist in disseminating and making more familiar to the public mind, an account of those means which he and others have found efficacious in resisting and counter-acting its destructive effects.

As, however, he has thus ventured to trespass on the notice of the public, it seems reasonable that that public should demand to be informed of the nature of his claims to its confidence and attention; and he hopes, therefore, to be pardoned, for presuming to introduce, in this place, a brief account of the circumstances which afforded him opportunities of practice and observation in this disease, such as perhaps have fallen to the lot of very few members of the medical profession.

For many years he was in the service of the Honourable East India Company on their Bengal establishment; and during the last thirteen years of that service was stationed at the Presidency, as surgeon to the district of the twenty-four Purgunnahs, in which are situated the city of Calcutta and its extensive suburbs: he was also surgeon to the Calcutta Militia, a corps consisting of about eighteen hundred men; and was, besides, in medical charge of the Mysore princes, and their numerous respective establishments. In his capacity of surgeon to the above-mentioned district, it became a part of his duty to afford medical aid to large bodies of convicts

employed on the public works, as well as to those confined in the extensive prison at Allipore, which alone contained, in general, not less than four thousand convicts. This latter class of patients the author thinks it right specifically to mention, because, amongst them, especially during and subsequent to the rainy seasons, he never failed, throughout the whole period above stated, to meet with many distinctly marked cases of Cholera Morbus. These were, however, for the most part, of a mild and tractable nature, and very rarely proved fatal; nor had the disease ever appeared as an Epidemic since the year 1787, when it raged at Arcot, till about the middle of the year 1817.

In August of the latter year, the natives began to suffer severely from the Cholera in the lower parts of Calcutta and in several of the populous villages in its vicinity, the Europeans remaining exempt from the disease until the beginning of September; but, from the end of the first week in this month, its attacks among them also became every day more frequent. The native inhabitants were by this time suffering so severely from its ravages, as almost to threaten the depopulation of the city and its crowded suburbs. In some cases nearly whole families, that had retired to rest in apparent health, were found in the morning either dead or dying; and in many others, several individuals of a household

had perished between sunset and sunrise. In most cases, a very short time only was afforded for the application of those remedies to which the native physicians had recourse; and these remedies were unfortunately too often found to be not merely useless, but of a pernicious nature—such, for instance, as the exhibition of cold drinks, or throwing over the patient's body large quantities of rose-water, then sprinkling sandal-wood dust over him, and fanning him till the already enfeebled vital powers were totally destroyed; or, as a last resource, they had recourse to prayers to their deities, and to all sorts of incantations. But even although a less absurd system had been practised, and their remedies had been of a more rational nature, (which indeed in many instances was the case,) yet, from the natural apathy of the natives of India, and from the little promptitude and exertion that were used in availing themselves of the short and precious interval that was afforded, the disease proved, in the great majority of cases, quickly and certainly fatal.

To these causes of fatal delay may also be added, the desire that exists amongst all classes of Hindoos to die either on the banks of the Ganges or some other sacred stream, to which it is customary for them to desire to be removed whenever they consider themselves as labouring under a mortal disease. But, to whatever causes

it may be attributed, whether to some superstitious notions of this sort, or whether to despair of obtaining relief, it is certain that the natives did at length relinquish all hope and all efforts at recovery, every individual attacked by the disease considering himself as stricken by inevitable death. The European part of the population also, now suffered very considerably, and the whole community was thrown into a state of the greatest alarm and consternation.

Under these circumstances, the Bengal government, in the hope of mitigating the public calamity and of restoring some degree of confidence, humanely authorised the employment of a great number of subordinate native medical assistants, and placed them at the disposal and under the direction of the author of this treatise, who, acting in concert with the Medical Board and the chief magistrate of Calcutta, made such arrangements for receiving the sick and administering medical aid, as he thought best calculated to arrest the ravages of the Epidemic, and to fulfil the benevolent designs of the government.

In July, 1818, he laid before the proper authorities a Report of those cases in which assistance had been afforded by the above means, and to this Report he appended Tables, of which the following are copies.

List of Patients attacked with Cholera Morbus, to whom the native Medical Assistants in the suburbs of Calcutta, employed for that purpose, afforded relief, from the 19th of Sept. 1817, to the 31st of January, 1818.

MONTHS.	No. of Sick.	Cured.	Died.	Convalescent.
From the 19th to 30th Sept. 1817.	2190	1920	243	27
From the 1st to 31st Oct. 1817.	3275	3122	132	21
From the 1st to 30th Nov. 1817.	1597	1554	40	3
From the 1st to 31st Dec. 1817.	1418	1368	46	4
From the 1st to 31st Jan. 1818.	*691	643	46	2
Total	9171	8607	507	57

Report of the number of Native Villagers and others who applied to the native Medical Assistants at Allipore, Bhowanypore, Soorah, and Russapuglah, and those with the Mysore Princes, &c. from the 19th Sept. 1817, to the 31st. Jan. 1818.

MONTHS.	No. of Sick.	Cured.	Died.	Convalescent.
Month of September, 1817	547	489	36	22
Month of October, 1817	485	464	14	7
Month of November, 1817	164	157	4	3
Month of December, 1817	162	153	6	3
Month of January, 1818	65	64	1	—
Total	1423	1327	61	35

* The native assistants were temporally discharged during the next three weeks.

Report of Patients attacked with Cholera Morbus, to whom the native Medical Assistants in the suburbs of Calcutta, employed for that purpose, afforded relief, from the 25th of February to the 15th of July, 1818.

MONTHS.	No. of Sick.	Cured.	Died.	Convalescent.
From the 25th to 28th Feb. 1818.	629	532	73	24
From the 1st to 31st of March.	2197	1950	216	31
From the 1st to 30th of April.	2187	1958	209	20
From the 1st to 31st of May.	1857	1742	97	18
From the 1st to 30th of June.	1605	1510	78	17
From the 1st to 15th of July.	948	887	46	15
Total	9423	8579	719	125

Report of the number of Villagers and others who applied to the native Medical Assistants at Allipore, Bhowanypore, Soorah, and Russapuglah, and those with the Mysore Princes, &c. from the 25th of Feb. to the 15th of July, 1818.

MONTHS.	No. of Sick.	Cured.	Died.	Convalescent.
Month of February, 1818	172	146	11	15
Month of March, 1818.....	638	584	42	12
Month of April, 1818	337	352	20	5
Month of May, 1818	263	250	10	3
Month of June, 1818	256	244	6	6
Month of July, 1818	153	150	2	1
Total	1859	1726	91	42
Grand Total	21876	20239	1378	259

By the foregoing Tables it will be seen that, of twenty-one thousand, eight hundred, and seventy-six patients attacked with the Epidemic, twenty thousand two hundred and thirty-nine were cured,* two hundred and fifty-nine were convalescent, (nearly the whole of whom ultimately recovered,) and only thirteen hundred and seventy-eight died, or but a fraction more than six in every hundred; whereas, in many instances, previous to assistance being afforded, scarcely the latter proportion of sufferers escaped. It must be observed, however, that the mortality varied very much in different districts, amounting, in some, to only a tenth, in others to a fourth, in some to a half; but in many, as for instance in Myensing, it spared neither age nor sex, and of those attacked almost all perished. In general, women and young children were much more exempt from the disease than males.

The author thinks he is justified in presuming that the number of recoveries would have been even still greater than is shown by the above Tables, if the friends of the sufferers had been more prompt and expeditious in bringing them to the receiving posts, or in obtaining, at their own houses, earlier aid of the medical assistants. But he has accounted for much of this

* Of these many were, no doubt, very mild cases, and such as will be found more particularly alluded to in a subsequent part of these remarks.

fatal delay in the foregoing part of these preliminary observations. It will be recollected that these returns refer to those patients only to whom medical assistance was afforded in the manner above described. The author regrets that he cannot, at the present moment, obtain access to his notes of cases, either in the Calcutta militia, or those in his private practice, the latter of which were numerous, and, from causes which must be obvious to every one, exhibit a still more favourable result.

In the early part of the year 1819, instructions were issued to the medical board, to draw up a report of the history and appearances of the Epidemic, which had committed such dreadful ravages; and it was resolved by the latter authority, to invite the members of the medical department to contribute such facts and observations as they might deem conducive to the object in view. This call was answered by several gentlemen, both of his Majesty's and the Honourable Company's medical service; and a Report to government, founded principally on these communications, was most ably drawn up by the enlightened individual* who was at that period secretary to the medical board. It may here, perhaps, be not improper to state, that among those who answered the call of the board was the writer of these observations, who was moreover in constant personal communication

* J. Jameson, Esq.

with the above-mentioned officer, respecting the progress and treatment of the Epidemic: the natural consequence of which communication was, that he should find a great deal of the information which he had himself supplied, (including the Tables inserted above,) interspersed in various parts of the public report; and to those who look only for originality of remark, the statement of these circumstances will suffice to account for many points of resemblance, and in some instances for the very same facts and observations, being found in this essay as are to be met with in the document just alluded to. Indeed, in a description of the character and progress of this very singular disease, it must necessarily happen, that facts which have already been mentioned by others will be again repeated; and that, where the inferences from those facts are clear, obvious, and indisputable, the same reflections will naturally occur, and similar remarks will probably be made by those who may, perhaps, have never seen any other account of the subject than that supplied by their own notes and memoranda.

In drawing up the following short treatise on the Cholera Morbus, the author has no higher ambition than that of being serviceable to his fellow-creatures; and although his principal design undoubtedly is, to communicate a concise and faithful account of what actually fell under his own immediate observation, yet he

has not by any means confined himself to these limits, but wherever he thought it would be conducive to the end he had in view, he has availed himself not only of the official compilation above alluded to, from which he has made copious extracts, but of every other source of information to which he has happened to have access.

In describing the symptoms, progress, and treatment of the disease, he has endeavoured to express himself, as far as possible, in popular terms, that he may be understood sufficiently for practical purposes, not by the profession only, but by every one who may chance to peruse these pages. For in many cases of Cholera Morbus it would be fatal to depend on the assistance of a medical practitioner, unless he happened to be close at hand, or within immediate call; and it is a somewhat remarkable feature in the Epidemic Cholera, that in all parts of India, and more particularly at remote stations, almost every respectable European and Indo-Briton of either sex, became perfectly well acquainted, not only with the symptoms, but also with the most approved method of treating the disease; and, actuated by feelings of compassion and humanity, contributed essentially, in almost innumerable instances, to the alleviation of the sufferings and the preservation of the lives of their afflicted friends, neighbours, and dependants. Should the observations contained in this essay lead, under similar circumstances, to the same result,

it will be to the author a source of the highest gratification, and will induce him to consider the following pages as not having been written altogether in vain.

SYMPTOMS OF THE CHOLERA MORBUS.

A VOMITING and purging of pale and watery fluid, either concurring or alternating with each other, or vomiting only, or purging only, with sudden and great prostration of strength and diminution of arterial action, accompanied by spasmodic action either of the extremities alone, or of the trunk generally, form the leading features of this disease.

In the Epidemic now to be described, the symptoms varied exceedingly according to the vigour of constitution of the individual; assuming a somewhat different character in Europeans and the robust natives of the upper provinces of India, from that which it generally exhibited in the inhabitants of Bengal—running in the former a longer course, and being attended with greater spasmodic action; but to this general rule there were, no doubt, many exceptions.

The attack in the inhabitants of Bengal, commenced by a feeling of great faintness and anxiety, with a sensation of excessive debility, and

of fulness and burning heat in the region of the stomach. Then came on sickness and vomiting, and usually at the same time a pressing desire to go to stool: the fluid evacuated, both by vomiting and purging, was pale or of a light muddy colour, and of a consistence and appearance slightly resembling gruel, without either taste or smell. The quantity evacuated, particularly by stool, was in some cases enormous. The pulse sunk rapidly, and soon became either imperceptible both at the wrist and temples, or could only be distinguished by a slight fluttering. The respiration, in the early stage of the disease, was unimpeded; but after some time it became laborious and difficult, with frequent but unsuccessful attempts at free inspiration. The surface of the body became suddenly pale and cold; the skin clammy and covered with large drops of cold sweat, and it very soon put on a purple or livid colour. The countenance was ghastly, and the features remarkably shrunk. The eyes, sunk in their sockets, always looked heavy and dull, and were sometimes covered by a film, and in many cases quite glassy and fixed. They were surrounded by black and livid circles. The lips were sometimes quite white, at others of a leaden or purple colour; and the skin of the palms of the hands was loose and puckered into folds. The mouth excessively parched: the tongue, at the commencement of the attack, was

white and cold to the feel, and the voice faltering and low. The hands trembled excessively, and the action of the voluntary muscles became unsteady. The patient, being unable to walk, staggered as if intoxicated, and, if not supported, sunk as in the last stage of debility.

In many cases, all these symptoms occurred in the course of an hour, and sometimes even less—and, for the most part, when death supervened, in the succession here mentioned. But it was more common for the patient, even when of a weak and delicate habit, not to be cut off till the expiration of four or five, or even eight or ten hours; and it was observed that death more frequently occurred early in the morning than at any other time.

Such was the course which this dreadful disease ran in delicate or enfeebled habits; but in more robust constitutions, and especially in Europeans, other and still more distressing symptoms arose. The first state of collapse was of much longer duration, and the subsequent sufferings of the patient were more prolonged. In these cases the vomiting, or purging, or both, were accompanied or followed by severe cramps, sometimes confined to the toes or fingers, but more commonly attacking at once the arms, calves of the legs, abdomen, and thorax or chest. The thirst was unquenchable, and after every draught of water or other fluid, the retching im-

mediately returned. The burning heat and anguish seemed almost intolerable: the restlessness never abated, the patient tossing about and unable to remain in a recumbent posture, constantly endeavouring to sit up and lean forward, but instantly again falling back. As he became exhausted, the vomiting became less frequent, and a small quantity of fluid only oozed out now and then at the corners of the mouth at each return of spasm, or small portions passed off by stool on any movement of the body.

All the symptoms of debility and exhaustion above enumerated continued to increase till the patient, occasionally wandering in his mind for a short time previous, at length sunk in death. In general, however, the functions of the brain remained unimpaired throughout, or were not disturbed until a very short period before death; while the action of the heart and arteries was almost instantly impeded, and sometimes even before the irritation of the stomach and bowels had begun to manifest itself. Retching and insatiable thirst were, perhaps, to the patient the most distressing symptoms. His calls for water and other fluids were incessant, although the moment they were swallowed he knew they would be followed by instant vomiting.

Some of the above symptoms were invariably present; but there was great variety both as to these, and as to the degree of violence with which

they occurred; and a still greater variety as to the duration of the disease. Sometimes *all* the phenomena above described were present simultaneously: sometimes they followed each other in the order of succession pointed out, commencing in most instances with the distressing faintness and sickness: sometimes, however, there was no vomiting at all, and very frequently there was vomiting, but no purging. In numerous other instances, and particularly in delicate constitutions, there was no spasm, nor any other affection of that kind, except occasional cramps in the stomach and upper part of the abdomen; but, whenever the patient was not cut off at once and by the first shock of the disease, the thirst and restlessness appeared invariably to prevail.

The instances in which patients were cut off, as it were, by the instantaneous annihilation of the vital powers, were certainly rare; but the author saw some cases of this kind. One happened to a patient in a lunatic asylum of which he had the medical charge. Having just spoken to the patient in question, who appeared in good bodily health, he was passing into another ward, when he was called back to see him, the native medical assistant reporting that he had been attacked with Cholera. The man was found in a state of complete collapse: no pulse at the wrist or temples: the eyes fixed and glassy: the circulation

and all the vital powers seemed to have been at once arrested ; and in little more than five minutes from the first attack, life was extinct. This man had no sickness, but had one enormous evacuation by stool, of the pale, thin, inodorous fluid peculiar to Cholera. In most cases, however, it happened that patients recovered from this first shock, fatal as it frequently threatened to prove, and went through the disease in the usual manner.

The vomiting, as has been before observed, was undoubtedly the most troublesome and embarrassing symptom, and in general, even in cases that terminated favourably, continued longer than any other ; though perhaps the spasms might be the most acutely painful, particularly those which affected the muscles of the abdomen and the calves of the legs, the muscles of which were often found quite full of hard knots.

The dejections were, for the most part, of the same nature as the fluid which was thrown upwards from the stomach ; though the latter was now and then of a reddish appearance, and more pulpy. The extent of the evacuations, both by vomiting and stool, would hardly be credited by those who had not witnessed the disease ; but they consisted entirely of the fluid above described—feculent matter never being observed to pass off until the disease was giving way. There was, throughout, a total absence of bile.

Whatever might occasion the morbid accumulation of the above-described fluid in the stomach and intestines, all the natural secretions appeared to be suddenly suspended. The mouth became dry and parched ; and, where the disease went through a lengthened course, the tongue became brown, yellow, or black, and the teeth and lips were covered with sordes. The kidneys ceased to perform their office during the attack ; and even when the patient recovered, it was many days before urine was secreted in the usual quantity.

Death, as has before been noticed, sometimes occurred on the very first shock of the attack, nature being completely overwhelmed, and making no efforts at re-action ; but where the strength of constitution was not defective, or the curative means had proved sufficient to withstand the first assault, she usually made great efforts to rally. The warmth of the trunk and forehead returned ; pulsation might be again distinguished at the wrist ; the spasms would cease, and the vomiting subside. The stools too would become black and feculent ; but unless these last were followed or accompanied by a copious discharge of bile, a decidedly favourable prognostic could not be given ; for it often happened that where this emulgence of the biliary ducts did not manifest itself, all the other flattering omens proved completely fallacious. Chills, hiccough, and

restlessness would return, attended sometimes by delirium: the vomiting would recur; and in a few hours, to the disappointment of the sanguine hopes of the patient's friends, death would terminate the scene. In these cases the patient had generally a peculiarly vacant and staring appearance of the eyes; fell into a low, lethargic state, disturbed now and then by deep moanings; or, in other instances, the breathing would become quick and stertorous, and the patient would exhibit signs of great mental and bodily anguish, and in this state would sometimes expire suddenly, as if from an inward violent spasm.

In some very mild cases, especially among the natives, the patients recovered spontaneously, and without any medical aid, or with the assistance of the simplest remedies, falling into a sleep and gentle perspiration. In such cases, the ill consequences of the disease were so soon over, that, on the day following, or even a very few hours after the attack, the patients might be seen returning to their usual occupations. In most instances of this kind a bilious and feculent discharge came on, or was procured by a gentle laxative, which was all that was required to complete the cure.

But where recoveries took place after the more severe attacks of the Cholera, the stomach and bowels remained long in a disordered state; pain and tenderness were felt in the region of the

stomach ; and it was not uncommon for diarrhœa or dysentery to take place, the debility continuing for several days to an alarming extent. With Europeans and very robust natives, the disease often ran on for three days, at the expiration of which, when the subsidence of the pathognomonic symptoms indicated a favourable termination, the stools became first black and pitchy, and afterwards feculent and loaded with bile ; and these discharges were attended with severe griping. The pulse became hard and full, and a degree of feverish excitement took place—the consequence probably, in a great measure, of the efforts made by Nature to recover herself from the severe attack she had experienced ; and possibly also occasioned, in some degree, by the large and repeated doses of the various diffusible stimuli, together with the other means of excitement, which had been employed in the first or collapsed state of the disease. The employment of these stimuli may also account for the distressing thirst which in most cases remained for several days, and after all the other disagreeable symptoms had disappeared.

It sometimes happened, that at this stage of recovery, when the patient was deemed to be proceeding towards a safe and satisfactory state, the slightest accident, or any imprudence of the attendants, or want of caution on his own part, would bring on symptoms of the most untoward

nature: the brain would become affected, the pulse rise to a hundred and twenty or a hundred and thirty in a minute, burning heat in the region of the stomach would be felt, the distressing thirst be increased, and the restlessness and agitation would return. The patient, when thus affected, called out continually and impetuously for cold water to relieve the inward burning; but, if this craving for cool drinks were indulged, the frightful state of collapse soon succeeded, the prostration of strength and the pain in the lower part of the abdomen returned, together with suppression of the biliary secretion, and disappearance of feculent stools. It rarely occurred that the patient long survived this unfavourable change.

In crowded cities and camps, where the strength of the virus was concentrated, it frequently happened that persons previously in good health were attacked in a moment, and quite unexpectedly. This was more uncommon in other situations, where no great body of people was crowded together, for here the disease was generally preceded by more or less disturbance of the alimentary organs; and under such circumstances it could often be ascribed to some obvious exciting cause, as sudden exposure while heated to cold air, or remaining exposed to the chilly morning air while sleeping, or to indigestible food, &c.

While treating of this part of the subject, it may be proper to introduce a remark which is at once important and consolatory, *viz.* that in no instance was it found that the same individual had the disease more than once; it is undoubtedly true, that many who were in a convalescent state suffered a relapse, either from their own imprudence or from some other cause; but the observation and experience of the writer, (and he believes also of all the other medical officers,) went to prove, that after a person had once fairly and completely recovered from the Epidemic Cholera, he did not appear to be subject to a future attack.

Having thus detailed the symptoms of this pestilence as they were found to occur in individuals, it may not be uninteresting, in this place, to lay before the reader a sketch of some of those appalling circumstances to which it gave rise in situations peculiarly obnoxious to its ravages. The consternation that was produced by its presence in the large commercial city of Calcutta has already been cursorily described in the Introductory Observations: the effect was, of course, similar in other populous towns; and, in the words of the Official Bengal Report, "In Jessore, situated in the centre of the Delta of the Ganges, and in which city it was for some time erroneously supposed that the Epidemic originated, it was reported to government on the 28th August, 1817, that it was attacking all

classes indiscriminately, and was cutting off from twenty to thirty persons daily; and that the inhabitants, astonished and terrified at the unaccountable and very destructive nature of its attack, were flying in crowds from the place, as the only means of escaping impending death. So little was the nature of the new pestilence yet understood, and such was the extreme consternation produced by it, that the civil courts of the district were shut, and a stop put for a time to business of every description. Although the general emigration which took place from the city would seem to have had a decidedly beneficial effect on the state of its health, by diminishing that density of population which has since been invariably found to be a powerful auxiliary to the Epidemic; yet such was the energy of the disease in this, its first onset, and so fatally destructive was it of human life, that in this district alone, it is reported to have cut off, within the space of a few weeks, more than six thousand of the inhabitants."*

The other description that the author will take the liberty of transcribing, presents a picture still more melancholy and terrific from the situation and circumstances under which the events occurred, *viz.* in a gallant army, which had recently left its cantonments in high health and spirits, to take the field against an enemy. The author

* See Bengal Med. Rep. p. 4.

alludes to the division of the army, encamped under the personal command of the Marquis of Hastings, near the banks of the Sinde in Bundelcund.

“ It was here (in the grand army) that the disease put forth all its strength, and assumed its most deadly and appalling form. It is uncertain whether it made its appearance on the 6th, 7th, or 8th of the month, (November, 1817.) After creeping about, however, in its wonted insidious manner for several days amongst the lower classes of the camp-followers, it, as it were in an instant, gained fresh vigour, and at once burst forth with irresistible violence in every direction. Unsubjected to the laws of contact and proximity of situation, which had been observed to mark and retard the course of other pestilences, it surpassed the plague in the width of its range, and outstripped the most fatal diseases hitherto known in the destructive rapidity of its progress. Previously to the 14th, it had overspread every part of the camp, sparing neither sex nor age in the undistinguishing virulence of its attacks. The old and the young; the European and the native; fighting-men and camp-followers, were alike subject to its visits, and all equally sunk in a few hours under its most powerful grasp. From the 14th to the 20th or 22nd, the mortality had become so great and general, as to depress the stoutest spirits. The sick were already so numerous, and still

pouring in so quickly from every quarter, that the medical men, although night and day at their posts, were no longer able to administer to their necessities. The whole camp then put on the appearance of an hospital. The noise and bustle almost inseparable from the intercourse of large bodies of people, had nearly subsided. Nothing was to be seen but individuals anxiously hurrying from one division of the camp to another, to enquire after the fate of their dead or dying companions, and melancholy groups of natives bearing the biers of their departed relatives to the river. At length even this consolation was denied to them, for the mortality latterly became so great, that there was neither time nor hands to carry off the bodies, which were then thrown into the neighbouring ravines, or hastily committed to the earth on the spots on which they had expired, and even round the walls of the officers' tents. All business had given way to solicitude for the sufferers: not a smile could be discerned, nor a sound heard, except the groans of the dying, or the wailings over the dead. Throughout the night especially, a gloomy silence, interrupted only by the well-known dreadful sounds of poor wretches labouring under the distinguishing symptoms of the disease, universally prevailed. Many of the sick died before reaching the hospitals, and even their comrades, while bearing them from the outposts to medical aid,

sunk themselves, suddenly seized by the disorder. Never was the impressive language of Scripture more applicable than now: 'In the midst of life we are in death.' All security of life was gone; and, as youth and vigour afforded no safety, even the healthiest man could not in the morning tell that he might not be a corpse before night.

"The natives, thinking that their only safety lay in flight, had now begun to desert in great numbers, and the highways and fields, for many miles round, were strewed with the bodies of those who had left the camp with the disease upon them, and speedily sunk under its exhausting effects. It was clear that such a frightful state of things could not last long, and that, unless some immediate check were given to the disorder, it must soon depopulate the camp. It was therefore wisely determined by the commander-in-chief, to move in search of a healthier soil and of purer air. The division accordingly marched in a south-easterly direction, towards Talgong and Sileia, and after several intermediate halts, on the 19th crossed the clear stream of the Betwah, and, upon its high and dry banks at Erich, soon got rid of the pestilence. But its line of march, during the whole of this movement, exhibited a most deplorable spectacle: although every means had been taken, by giving up the ammunition carts, and collecting ele-

phants and draught cattle to procure sufficient carriage, the sick were found too numerous to be moved, and were, in part, necessarily left behind ; and as many who left the carts, pressed by the sudden calls of the disease, were unable to rise again, and hundreds dropped down during every subsequent day's advance, and covered the roads with the dead and dying, the ground of encampment, and line of march, presented the appearance of a field of battle, and of the track of an army retreating under every circumstance of discomfiture and distress."*

APPEARANCES AFTER DEATH.

IN a post-mortem examination of patients who had died of the disease, the first circumstance that attracted attention, and which strikingly proved a great accumulation of blood in the large cavities, was, that the thorax and abdomen continued preternaturally warm long after the extremities had become cold and livid. On laying open the bodies of those who, from weakness of constitution, had sunk early under the disease, it often happened that no other unhealthy appearance presented itself, than a slight

* Bengal Med. Report, p. 17.

degree of contraction of the stomach, and a preternatural hardness and congestion of the liver; but in almost every case the abdomen emitted a peculiarly offensive odour, which sometimes affected the person making the examination with nausea for some hours afterwards.

In the stomach, which was generally inflated, were often found, even after severe vomiting, particles of undigested food, but more frequently a considerable quantity of the pale, muddy fluid before described, in which it was not uncommon to find floating flakes of a curdled matter. Where the patient had lived to go through a protracted course of the disease, the coats of the stomach were found contracted and thickened; the contained fluid was of a darker hue than that which had been ejected by vomiting, and in a few instances, there was an appearance of blood being mixed with it. In these cases, the inner surface of this viscus was found lined with a dark-coloured coagulable lymph, or a viscid, glairy matter, and the coats themselves partially inflamed. The mucous membrane was generally found of a very pale colour; but where the disease had lasted a considerable time, or where the patient had been destroyed by a secondary attack, there frequently appeared, near the pyloric extremity of the stomach, patches or streaks of a florid colour, as if arising from incipient inflammation.

The whole of the intestinal canal appeared

much paler than usual, and was either filled with the peculiar fluid above described, or inflated with air. Where the disease had been of long duration, the intestines were often found considerably displaced, and not unfrequently intussusception of the small guts had taken place. In these more violent cases, from the distention of the mesenteric veins, the intestines were rendered of a dark or purple colour. The inner surface of the duodenum generally resembled that of the stomach, containing a large quantity of greyish fluid, having flakes of the curdled substance before noticed. The mucous membrane also exhibited the same pinkish spots or streaks as were occasionally seen in the stomach. In such patients as were early cut off, the large intestines contained a great quantity of the greyish muddy fluid; but in cases of longer standing, they were lined with a thick, pitchy or grumous matter. In general, no fœces were met with, nor was there any appearance of bile. The colon was most commonly contracted, though sometimes, on the contrary, violently inflated and distended. The rectum, especially near the anus, was highly vascular.

The liver, though sometimes soft, pale, and pappy, was, in the great majority of cases, enlarged, hardened, and highly gorged with blood, which flowed out most copiously on an incision being made into its substance.

The gall-bladder rarely contained healthy bile, but, when not found quite empty, it contained, especially in natives and others of a delicate frame, a quantity of a thin, pale fluid, not possessing either the appearance or qualities of healthy bile; and in robust Europeans, it was not uncommon to find in it a very thick, dark matter, somewhat resembling inspissated bile mixed with pitch. It did occasionally, though not frequently, occur, to find healthy bile; but this generally happened in cases where the patient had sunk under secondary symptoms, brought on by some imprudence or accidental circumstance.

The spleen was soft, almost always larger than ordinary, and full of blood.

The urinary bladder was invariably found empty.

The venous trunks contained in the abdomen were always found much distended, especially the vena cava, which in many instances was enlarged far beyond its usual diameter, and quite hard; as were also the mesenteric veins. The lacteals were greatly distended with chyle.

In the thorax, the heart and great blood-vessels contained a quantity of clotted blood. The lungs were heavier than usual, and of a darker colour. The inner surface of the œsophagus was sometimes vascular. In short, throughout the whole of the abdominal and thoracic viscera, where the disease had run its full course, there

was almost uniformly found an appearance of great venous congestion, though rarely of inflammation.

In the brain also, in those who had not been cut off early, there were generally found marks of venous congestion. The sinuses were full of blood of a very dark hue: adhesions had but in a few instances taken place between the dura-mater and arachnoid, and, in those cases which have been mentioned as accompanied by stupor or the peculiar staring appearance of the eyes, serous effusions between the membranes, as well as throughout the cavities of the brain, had not unfrequently occurred.

The foregoing were the appearances that most frequently presented themselves in the cases examined by the writer, and by others situated in the same part of the country. But, in some of the divisions of the army, and in large towns in the Upper Provinces, they were occasionally met with, in certain respects, different: viz. in some, the inner coats of the stomach and intestines were found ulcerated and mortified, and the small intestines contracted and full of small, hard knots: the same morbid congestion in the liver was always found, and this viscus was of an exceedingly dark colour. In a few, though but a very few cases, it was also found highly inflamed.

PROXIMATE CAUSE OF THE DISEASE.

AFTER the minute detail that has been given of the symptoms of Cholera, and of the appearances after death, it would perhaps be more judicious to allow the medical reader to draw his own inferences, and exercise his own discrimination in deciding on its proximate cause, than for the author to offer an opinion, acknowledging, as he frankly does, that he has not hitherto been able altogether to satisfy his own mind on this obscure point. It is, indeed, one of those subjects which affords scope to an endless variety of conjecture, and which, it is feared, may for some time longer remain enveloped in doubt and mystery. Still, however, had these Remarks been addressed to the members of the profession only, he would have felt it impossible to pass over this part of the subject without the most anxious endeavour to assign an adequate cause for some of the phenomena that occur in such an extraordinary and violent disorder. But as they are especially designed for the use of non-professional readers, it is foreign to the author's plan to enter at length into this pathological enquiry ; he will, therefore, confine him-

self to a few remarks only, of such a nature as may tend, in some measure, to explain the principles on which one branch, at least, of the method of treating the disease has been adopted; reserving to the two following sections, those on the remote and exciting causes of Cholera, to enter more fully into that detail and those considerations, which possess a more popular interest, and which may perhaps be found more generally useful.

From the facts that have been already stated, and from the appearances on dissection, there can be no doubt that the stomach and intestines are deeply implicated in the disease. But although the primary symptoms generally manifested themselves in these viscera, and although nausea and vomiting were among the most troublesome and intractable symptoms, and in many cases continued after every other had subsided, yet it must be kept in mind that, in some instances, there was neither nausea nor vomiting; in others vomiting, but no purging; and, in a few, that neither one nor the other of these was present; the patient complaining only of debility or burning pain at the upper part of the abdomen, and being carried off by a violent and general spasm.

In those who had been cut off early no diseased appearances were found, either in the stomach or intestines, except their being paler than usual, and containing a small portion of

that peculiar fluid, for the inordinate secretion of which it is so difficult to account. Under these circumstances, the proximate cause of the disease cannot with any certainty be referred to the stomach and intestines.

The diminished action of the heart and arteries, though occurring early, was in general preceded by nausea and vomiting; nor indeed, (although it would be rash to deny an intimate connexion between them,) would the disturbance in the circulating system, by any means, account for the greater part of the symptoms that were present. Dissection showed no disease of the heart or large blood-vessels in the cavity of the thorax, and the accumulation of blood in the centre, and distention of the venous trunks, arose, perhaps, in a great degree, from atony of the vessels on the surface, or the excessive disturbance of the balance of the circulation, occasioned by the shock of such an overwhelming disease.

Although it would naturally occur to the professional reader, that the sudden collapse of the vital powers, and the almost instantaneous depression of strength, occurring in this disease, could only be occasioned by some violent morbid agent, acting on the nervous system, yet the clear and undisturbed state in which the intellectual powers remained to the very last, renders it doubtful, at least, if not improbable, that the disease should have originated in a

morbid state of that system. The appearances of the brain, in those who had long struggled with the disease, may possibly be, in a great measure, attributed to congestion, dependent on the exhaustion of the vital powers, and favoured, in the production of its effects, by the intolerable and prolonged sufferings of the patient.

Various writers have assigned various causes to this disease, some attributing it to a morbid secretion from the mucous membrane, resembling catarrh ; others supposing it to arise from the presence of a peculiar acid ; but neither of these hypotheses appears satisfactory, nor would they, if tenable, be likely to lead to any improvement in the method of treatment.

Seeing, then, that the proximate cause of this remarkable disorder cannot be satisfactorily ascribed to the morbid state of any of the other viscera, the author is disposed to consider the liver as chiefly and primarily concerned in its production. This, as is well known, is the largest gland in the human body, and its functions are so important to the system, that it exercises the most extensive influence over all the other viscera, and more particularly over those with which it is in immediate contact or connexion ; and this holds good in an eminent degree with regard to the stomach, which is connected with the liver, not only by juxta-position, but by the closest sympathy ; so that the latter

no sooner becomes the subject of functional derangement, than the former, together with the whole intestinal canal, is instantly and powerfully affected. The liver is known to be peculiarly susceptible of morbid impressions, received through the medium of the skin, occasioning functional derangements, and more particularly so at certain seasons of the year, when great heat and dryness have been suddenly succeeded by cold and humidity. Now, in a subsequent part of this treatise, it will be seen that the first attack of this Epidemic was preceded by remarkable irregularities of the season, and by frequent and sudden atmospherical vicissitudes; and when we bear in mind the morbid sympathies, above alluded to, it may not be very difficult to imagine that the violent disturbance of the system, which occurs in Cholera Morbus, may arise from the liver being suddenly and violently acted on, through the cutaneous lymphatics, by some poisonous matter floating in the atmosphere, so as, at once, to have its functions suspended or destroyed, and thus to induce those derangements of the stomach and intestinal canal, that present themselves in the course of this virulent disorder. At the same time, by the action of cold and humidity, the exhalation from the skin becomes suddenly checked, a greater volume of blood may be thrown into the liver than its secreting powers are able to dispose of, occasioning that general,

but, more particularly, that hepatic congestion which is so generally observed on a post-mortem examination.

The appearance of the liver, on dissection, was no doubt very different in different subjects ; yet it may be remarked, that however healthy other parts might appear, this viscus was rarely found in a natural state ; it was almost invariably of a very dark colour, ponderous and highly gorged with blood ; though in some cases it was found very large, soft, and pappy, in neither of which states was it in a condition to secrete healthy bile ; nor was healthy bile discovered either in the gall bladder, or in any part of the intestinal canal : and where the exceptions to this occurred, it was in those cases in which all the violent symptoms had given way, and the patient had sunk from exhaustion, or been carried off by secondary symptoms. It may be proper here to repeat the remark, that no patient could be considered out of danger, and that, in fact, very few did recover until feculent motions, accompanied or followed by a copious flow of bile, had been procured, which shews, at least, that there was some immediate and intimate connexion between the suspension of the hepatic functions and the existence of the Epidemic Cholera. Nor is it easy, except under the above supposition, to account for the salutary effects of calomel, which both before and after the balance of circulation had

been, in some degree, restored, (but especially in the latter case,) was exhibited, in every part of the country, with such singular advantage: it acted most probably locally and specifically on the liver, tending to reproduce its peculiar secretion, and, at the same time, to effect that emulgence of its ducts, which was, in all instances, proved to be absolutely necessary to the patient's safety.

In treating of the etiology of this disease, the author is fully aware of the difficulty and obscurity of the subject, and the opinion, above given, is offered with the greatest diffidence: he cannot, however, help flattering himself, that, in taking this view of the disease, he has made some little approach towards the truth; and he thinks he is, in a certain degree, borne out in his opinion, not only on the ground of morbid sympathies, but by the result of that method of treatment, which was found, upon the whole, the most frequently successful.

OF THE REMOTE CAUSE OF CHOLERA.

IF difficulties were met with in the last subject of enquiry, these are very much increased on attempting to ascertain the remote cause of the disease.

It has ever been found a matter of great difficulty to account for the origin of those general pestilences which have, from time to time, afflicted the different regions of the earth ; nor can the author entertain a hope of being more successful than others in discovering the primary cause of that horrible scourge, of which he is now treating—all he can presume to do is to relate some of the peculiarities attending its frightful progress, and those atmospherical vicissitudes and irregularities which preceded its first appearance.

In this, as in the preceding section, he is desirous of leaving it to the reader's judgment to form an opinion on the subject ; and in order to put him in a more favourable situation for doing so, some brief remarks (chiefly extracted from the Bengal Report) will be introduced, in this place, on the nature of the seasons, in general, in India, where the Cholera Morbus first showed itself as an

Epidemic, in the year 1817, and where indeed, from that time to the present period, it has, from time to time, prevailed to a more or less alarming extent.

The seasons in India are, in general, remarkably regular, having three divisions—the cold, the hot, and the rainy: the first commences with November, (though the latter part of October is often cool and pleasant,) and during this period, which ends in February, the weather is, in general, very delightful, a cold, sharp wind blowing steadily from the north. The thermometer in the shade ranges throughout from 48° to 85° , mean heat about 69° , mean altitude of the barometer $29^{\circ} 99'$.

About the latter end of February the weather begins to be much warmer, though the nights are still cool; and by the beginning of March the hot season sets in: the days become, during that month, excessively warm; but, about the end of March, or beginning of April, the atmosphere is occasionally refreshed by what are called north-westerners; these storms being preceded, during several days, by cloudy mornings, strong gusts of wind and distant thunder. Then, about sunset, the wind, which had been high, falls suddenly, and a profound calm ensues; the air becomes excessively oppressive, the clouds, in the north-west, form a black, lowering bank, vivid flashes of lightning and loud thunder fol-

low, and at length the dead calm is succeeded by a tornado and clouds of dust, which completely darken the horizon; now descend torrents of rain, accompanied by tremendous and quickly-repeated claps of thunder, and these are, at length, succeeded by a serene sky, and a delightful freshness and coolness of the atmosphere. April is generally, throughout, a windy month, the weather is hot, but pleasant, till the end of the month, when the nights become oppressively sultry; the hot wind is sometimes succeeded by refreshing showers. In the early part of May windy weather continues, generally, to prevail, till about the middle of that month, when the winds become less constant; it is sultry, close, and oppressive, and the nights are particularly unpleasant: great dejection and lassitude are felt, and these are only relieved by the frequency of the north-westerns. The thermometer during the hot season ranges from 75° to 94° , mean heat about 84° , barometrical altitude $29^{\circ} 74'$.

About the end of the first week in June the rainy season commences, and continues during the remainder of that month, and through July, August and September, and, sometimes, the early part of October. They generally set in from the south and east, and continue for many days with great violence. At the end of this period there is occasional fair weather, and the nights are beautifully clear and starlight; but this fair weather

never lasts many days, the heavy rains, every now and then, recurring. Storms of thunder and lightning are very frequent. The wind is pretty constantly from the south and east, veering, however, sometimes a little to the west of south. The weather becomes cooler, though the nights often continue oppressive. The thermometer ranges from 75° to 89° : the mean heat being about 81° . The mean altitude of the barometer is $29^{\circ} 45'$.

In October the days are still hot and sultry, but the nights begin to be cool and pleasant, and are attended with very heavy dews. The barometer rises rapidly, and, towards the end of the month the thermometer falls to about 70° . The total quantity of rain that falls, differs in different years; but the average may be stated at about 70 inches.

The above short account of the seasons is more especially applicable to the lower provinces of Bengal. There had been very great irregularities in them for two or three years before the breaking out of the Epidemic. In 1815 the rains had been excessive, bursting the banks of the Ganges and other large rivers, and causing great inundations throughout the country. The succeeding cold season was remarkably damp and unpleasant; and the hot season that followed was observed to be hotter and more oppressive than usual, the thermometer often standing, in

the shade, at 98° ; and many natives and Europeans falling down dead in the streets. In April there was felt the shock of an earthquake; and in the following July a second shock was experienced. There was a suspension of rain in August, when the weather became intolerably sultry, and many of the rivers were dried up. About the middle of September the rain recommenced with unusual violence, and continued to fall till the middle of October, causing greater and more destructive inundations than had happened within the memory of man.

The effect of these violent irregularities was an unwholesome condition of the atmosphere, producing low fevers and typhoid diseases; and throughout the upper provinces, a bilious remittent fever, somewhat resembling the yellow-fever of the West Indies, raged in every city, town, and cantonment; and, in an immense number of cases, after running a short course of three or four days, proved fatal. A great mortality also took place about the same period amongst horned cattle and other animals.

It has been thought right to mention these circumstances, though not immediately connected with the subject under discussion, as serving to prove the unwholesome state of the atmosphere previous to the appearance of the Cholera Morbus.

The ensuing cold season was warmer than usual, and remarkably foggy; and, what was

uncommon, a great deal of rain fell in the month of February, and the same also happened in the following month; and, throughout the whole of March, there were very frequent thunder-storms. The air was unusually cool for that season of the year, but raw and unpleasant. The mean height of the thermometer was about 75° . Still, however, both Europeans and natives, in the province of Bengal, remained quite healthy.

Throughout April the weather was still unseasonably cold; but early in May it became hot, the thermometer standing in the middle of the day, in the shade, at 90° . About the middle of that month, or three weeks earlier than usual, the rains set in with great severity, and with very little remission. The city of Calcutta was not, however, more unhealthy than common, though fevers and bowel complaints prevailed in a moderate degree. In July an immense quantity of rain fell. The atmosphere was not unpleasantly hot; the thermometer varying from 80° to 87° . In August the rains were incessant, with an east and south-east wind; and the natives *now* first began to suffer from the Epidemic Cholera. As, in the production of this disease, much stress has, very naturally, been laid on these unusual variations of season and vicissitudes of temperature, it has been thought right to enter more minutely into the history of the climate of Bengal, in the years 1815, 1816, and 1817, than

under other circumstances would have been necessary.

Much weight must, no doubt, be given, in any enquiry as to the origin of Cholera, to the circumstances just now detailed; but yet, a precipitate judgment on this point must not be formed; for, although these irregularities, and this remarkably humid state of the atmosphere, may, with great probability, be assigned as the chief remote cause, yet vicissitudes of temperature, very similar to the above, had often occurred, without giving rise to the disease; and both Europeans and natives have repeatedly been subjected to every variety of season and weather, at every period of the year, and under the most unfavourable circumstances, without the appearance of any disorder in the slightest degree resembling this Epidemic. Again, although the above irregularity of the seasons prevailed in almost every part of India, yet many detachments of troops, though subjected to every species of exposure and hardship, escaped the disease until they happened to come within, what appeared to be, the line of its influence. Indeed, the whole history of the disease and its progress, shows that it did not arise, solely, either from the humidity or from the variations in the atmosphere; for it is known to have arisen at every period of the year, under every degree of heat and cold, of dryness and moisture; sometimes in the cold, and some

times in the hottest season, but, perhaps, most frequently in the midst of the periodical rains.

In treating this obscure and ill-understood branch of our subject, however unsatisfactory such a course may be deemed, we must be contented to deal for the most part in negatives only; and, in conformity to this plan, it may be observed, that, as variations in temperature have been found insufficient to account for the disease, so also has the use of particular kinds of food, though much importance was attached, at one period, by a member of the medical profession, to the use of rice of a particular crop, and of blighted and injured grain. It is scarcely necessary, however, to say a word in confutation of this opinion; for it is well known, that throughout the different tribes of India, every possible variety of food is employed; and though the inhabitants of Bengal and the lower provinces use rice as their principal nourishment, yet it is seldom or never tasted by the natives of the upper provinces, who almost invariably give the preference to wheat; but, still, both classes suffered alike from the pestilence.

Europeans also, whose habits are altogether so different, and especially European sailors, whose food had so completely varied in every respect from that employed by the natives of any part of India, suffered, in all cases, most severely from the Epidemic, the moment their

ships arrived in those ports which were within the range of its baneful influence, and, oftentimes, *before any communication whatever had been held with the shore*. Being unable, then, to assign the true remote cause, it could answer no good purpose to go more at length into this speculation; the author will consequently desist from the attempt, and proceed to enquire what those circumstances were, which seemed most readily to bring this disease into action in those places which, from some latent cause, appeared to have been peculiarly obnoxious to it.

It is a singular fact, that, throughout the whole of its progress, there was always a tendency shown by the disease to spread from east to west. It was natural, therefore, to look for some explanation of this phenomenon in the prevailing course of the winds at that period; and it so happened, that, in a great majority of instances, and in almost every situation, it was found that the wind was blowing either from the east, or east by south, at the time of the breaking out of the Cholera; and it was also observed, that the course of the winds had a very marked and decided effect on the violence and progress of the disease; for, while it raged with peculiar activity during the prevalence of an easterly wind, it was frequently observed considerably to decline, and, in some instances, almost to disappear, on the setting in of a northern or western one.

This rule was not without exceptions, yet they were not sufficiently numerous to destroy the impression that some intimate connexion existed between the Epidemic and certain courses or currents of wind; but, whether that from the east and south-east merely served as the most ready medium of communicating this virus from place to place, or, whether it possessed any other or greater influence on the disease, can only at present be a matter of conjecture.

There was a marked disposition in the Cholera to follow the course of rivers, and this circumstance may, perhaps, be explained on two different grounds; first, it is to be recollected, that, in general, the rivers in India flow through a low and level country, subject to periodical inundations, and to copious depositions of mud and slime, on which a tropical sun acts powerfully the whole day. Hence, in all probability, they must prove the fertile source of miasm. In short, all the circumstances that predispose to the reception of the Epidemic are, probably, to be found in their neighbourhood. Secondly, the banks of the Ganges, and other sacred streams in India, are crowded with towns and villages, giving rise, throughout their whole course, to a dense population; and, as many sacred spots on their banks are, besides, resorted to by pilgrims from every part of India for devotional purposes, these circumstances may very readily account

for the disease arising, and again and again re-appearing, in the course of large rivers. It is, at the same time, difficult to account for a circumstance which was in many cases very observable, *viz.* that the Epidemic would occasionally commit its most dreadful ravages on one side of a river, or even of a narrow stream, and leave untouched the opposite bank, although both were apparently placed under precisely the same circumstances; and then, after travelling a longer or a shorter course, it would return and exert all its baneful power on the places which it had before so unaccountably spared. Then, perhaps, after subsiding or disappearing altogether, it would, sometimes, without any assignable cause, return to a place it had before visited, and again commit the most deadly havoc.

That the severe visitation of the disease, in the course of rivers and among a dense population, may be explained by the causes above noticed, is rendered further probable by the same phenomena having occurred under the author's own observation, in the city of Calcutta and the adjacent villages. Many of the latter are placed in low, swampy situations, and, at that period also, many of the most crowded parts of the city were very imperfectly drained. There were, likewise, in the lowest and most thickly inhabited quarters, many pools and ditches of stagnant and filthy water, on the margins of which it was

the custom of the natives to sleep during the hot and sultry nights. In such situations the Cholera raged with double and dreadful fury, while the drier, better drained, and more thinly inhabited parts of the town, suffered, comparatively, very little.

The same observations may be made in reference to the whole country, the disease showing the greatest predilection for places, like those above described, where an over-crowded population, and the other causes above detailed, appear to have adapted them, in a peculiar degree, for its reception. That this was the general rule, is proved by universal experience and the whole history of the disease; yet so capricious oftentimes was its progress, that this rule had its inexplicable exceptions. In a few districts, all parts, whether situated high or low, whether dry or humid, were equally affected; and in one or two instances, it seemed even to show a disposition to invade dry and healthy, rather than damp and unwholesome situations. This was the case with the European invalids at Allababad, whose lines were in a high, remarkably dry, and healthy situation, but who were, notwithstanding, very severely visited by the pestilence; while the native artillery, who were cantoned in the low, swampy suburbs of the city, were almost entirely spared. Still, however, these rare exceptions cannot affect the general conclusion that high,

dry, and airy situations, did in general enjoy a considerable immunity from the attacks of the disease. Analogy will also bear us out in this opinion; for it is a fact well known, that the plague always becomes more prevalent, and rages with more severity in Egypt, at those seasons when the inundations of the Nile have deposited a quantity of slime and mud on its bank, which, under the influence of the sun, produce the most noisome and unwholesome exhalations.

Upon the whole, then, it may be reasonably concluded, first, that the Epidemic Cholera owes its existence neither to unusual humidity of the air alone, nor merely to atmospherical vicissitudes, but to a peculiar, active poison, engendered in the atmosphere under circumstances of which we are at present ignorant; secondly, that this virulent matter is conveyed from place to place by the agency of certain currents of air; and thirdly, that, according to observation and experience, the east and south-east winds constitute its readiest medium of communication.

The discussion of this branch of the subject leads naturally to a very important question, namely,—

IS THIS DISEASE OF A CONTAGIOUS NATURE?

WHETHER considered in reference to the welfare of the community at large; or to the comfort and safety of those unhappily attacked with Cholera, this is, undoubtedly, a most important question; and although the experience of nearly all the medical practitioners most conversant with the disease as it appeared in India, and the universal popular opinion and belief throughout that peninsula, concur in giving an answer decidedly in the negative; yet, on a point of such paramount interest, and regarding which such conflicting testimony has been given by medical men in Europe, the public has a right to expect something more satisfactory than popular belief, or the concurring opinion of the Indian medical staff. The author, therefore, considers himself bound to give that sort of testimony, from his own experience and that of others, which, in connexion with the facts he is about to select, (out of many bearing equally strong on the question,) must, he thinks, prove satisfactory on this head.

In the first place, according to the Bengal Official Report, this disease arose in many dif

ferent places at one and the same time, and within a very few days it was raging in the unconnected and far-distant districts of Behar and Dacca. Now it is by no means probable, but, on the contrary, against all experience, that it should have been communicated from place to place in the space of a few days only, through the many hundred miles that intervene between these districts; for the result of a number of observations shows, that in its progress from one place to another in any particular course, as, for instance, the course of a large river, its average rate of travelling, as marked by the successive periods at which places were affected, did not exceed five miles a day, and was very often still slower.

It differed from small-pox, plague, and other contagious diseases, in this, that, whenever it broke out in a town, camp, or cantonment, instead of daily increasing, and being perpetuated by the very means on which it fed, it invariably ran, within a given time, a regular course of increase, maturity, decay, and extinction. This peculiarity the author witnessed in the instance of the city of Calcutta, where the Epidemic broke out in the month of August, 1817, increased in strength and virulence during the months of September and October, began to subside from the beginning of November, and had almost disappeared by the end of January, 1818.

But, what happened in many other situations

occurred here also ; for, after an interval of about three weeks or a month, the disease re-appeared with more than its pristine violence, and again ran through the same course of increase, decrease, and decay. Now, as the author of the Bengal Report very justly observes, this uniformity of rise and declension appears to be quite inexplicable upon the supposition of contagion ; for if the virus were capable of reproduction, through the medium of effluvia, or the secretions of individuals already infected, it must have gone on augmenting, until it either had no longer subjects upon whom to exercise itself, or was stayed by some powerful counteracting means, such as uncongenial seasons, or segregation, and the other prophylactic expedients usually resorted to on such occasions. This, at least, is the course commonly pursued by the plague and other contagious diseases. When once these are unfortunately introduced into a city or tract of country, they not only for a time remain prevalent in it, but go on daily increasing and perpetuating themselves by fresh accessions of infectious matter, until they either have depopulated the place, or are checked by some of the circumstances mentioned above. If the form and progress of the Epidemic Cholera had suggested the expediency of similar safeguards, they would, no doubt, have been proposed and acted on wherever it appeared. But, excepting the

step wisely adopted in some of the camps in which the disease largely prevailed, of moving from the vicinity of the dead in quest of higher ground, and of a purer atmosphere, (a step which could have placed no check upon contagion, as most of the sick, and all the infected baggage accompanied the main body,) no means of security whatever of that sort, seem in any case to have been thought of: the truth is, that all men were convinced that they were wholly unnecessary.*

Some facts shall now be stated, which serve strongly to contra-indicate the contagious nature of the disease.

From the centre division of the Bengal army, in which it will be recollected the Cholera put forth its most destructive strength, a few days previous to its breaking out, a small force, consisting of four troops of the 7th regiment of native cavalry, three light companies of sepoy, and the dromedary corps, was detached on particular service in the neighbourhood. A short time afterwards the remaining squadron of the corps of cavalry was sent as a reinforcement from the great camp, *in which the disease had then got head*. This party carried the virus along with it, and actually lost several men after its junction with the foregoing detachments, *which nevertheless remained perfectly healthy throughout*.

* Bengal Report, page 127, et seq.

But there is yet a still stronger instance of the possibility of a diseased body of men joining a healthy one, without thereby communicating the infection. On the morning of the 11th of May, 1818, a detachment of ninety men of the first battalion of the 26th native infantry, marched from an inferior post to join the main body of troops then encamped at Saugor. After an ordinary march it halted, in perfect health, half way, under shelter of a few trees, on the banks of a small lake, situated in the midst of an open space about three miles in circuit, and surrounded by low, woody hills. The whole remained well till the fall of night, when Cholera broke out amongst them. The first man was taken ill at midnight, and died in half an hour. Several others fell sick within the next few hours; and, before sun-rise, twenty out of the ninety were overtaken by the disease. Although the Saugor camp was distant only five or six miles, yet the detachment was too weak to move without assistance. The sick of the sepoy and followers were therefore carried in carts and doolies or litters, sent from the main body; but before eleven, a. m. when they got to their ground, five were already dead, and two others moribund. Next morning a man of the same party was seized in the act of scouring his accoutrements, immediately became insensible, and expired in a few minutes. During the three succeeding days

several others were taken ill, and before the end of the week, of the whole detachment there was not a single man that was not sent to the hospital labouring under Cholera. The men of this party *mixed promiscuously and unreservedly* with those of the Saugor camp, and yet, of the latter, *not one individual got the disease.*

An instance of the same kind occurred in the Hansi Division, except that, here, the party which escaped went into the infected medium, instead of having the pestilence brought in amongst them. *When the disease was at the worst with the troops composing this force, Casement's corps of irregular horse entered the camp, and continued with the division during the remainder of the service, yet it did not suffer at all!*

It would be very easy, but is quite unnecessary, to multiply proofs of this sort, and the writer will therefore extract from the Report only one more instance, as it occurred in a different quarter, and under different circumstances. Of the cluster of islands lying near the main land, where the Ganges discharges itself into the Bay of Bengal; Sundeeep, a large and populous one, *remained quite free*, while those of Deccan, Shahbuzpore, Huttiah, and Bomnee *were ravaged.* There was, nevertheless, *constant and unrestricted intercourse between all.**

* Bengal Report, page 134, et seq.

Although a few instances to the contrary are mentioned by some writers, yet, in general, it was observed that the medical and other attendants on the sick were not more liable to be attacked than those who had no sort of communication whatever with the infected : nor did it appear to be communicated either from actual contact by constantly handling and assisting the patients, nor even from inhaling their breath in the worst stages of the disorder. Nor when those affected with Cholera were taken to general hospitals, did the other patients suffer from juxta-position, or from breathing, day and night, the same atmosphere in the same wards. Neither did the compounders, or dressers, nor those employed to convey the sick, nor any other portion of the hospital establishment, though exposed to the most fatiguing and harrassing duties, suffer more frequently from the disease than other camp followers : not did the soldiers, who constantly flocked to the hospitals, to see and watch over their sick comrades, appear to be more susceptible of the disease than others.

In the division of the army before alluded to, when the Epidemic raged with its utmost fury, when the whole camp was a sick ward, and when every tent was filled with, or surrounded by the dead and dying, the officers suffered comparatively little : from a number that could hardly have fallen short of three hundred, only five or six

deaths occurred, and this, too, at a time when officers of every description were almost equally exposed with medical men; for the sick had become so numerous that even the services of all were insufficient to tend them with proper care, and duly administer the necessary remedies. And, of a medical list consisting of between two hundred and fifty and three hundred individuals, most of whom saw the disease largely, three only were attacked, and one died.* This fact is very remarkable; as, from the incessant and fatiguing duties they had to perform, and the painful anxiety of mind and depression of spirits they must have experienced at such a period, it might reasonably have been supposed that they were peculiarly liable to be attacked by the Epidemic.

From the above circumstances, and from witnessing, in almost innumerable instances, the very partial manner in which it attacked the members of families living under the same roof, and even in the same room, and having, throughout, the most unrestricted intercourse with each other, the author, upon mature consideration, is himself thoroughly persuaded that the Epidemic Cholera of India is not subject to the common laws of contagion; but in endeavouring to demonstrate to the reader the correctness of his conclusion, he has preferred rather to quote

* Bengal Report, page 129.

the testimony of others than to advance his own.

He cannot expect these opinions of his to be considered as conclusive of the question ; but, knowing the paramount importance to the sufferer under this disease, of the unremitting and assiduous care and attention of those most interested in his safety, and how small, without these, would be the chances of recovery, he most sincerely hopes they may be useful, and that the facts he has adduced in this section may tend, in a considerable degree, to lessen the general alarm and intense anxiety at present felt on this important point. It is with the utmost diffidence that he ventures to promulgate an opinion which would seem to be at variance with that of so high an authority as the Board of Health—so far, at least, as is implied in their recommending “the immediate separation of the uninfected from the sick,” by their “prompt removal from the house of any infected person, or by the removal of any individual affected with the disease; or, in the event of such removal not being practicable, the prevention of all intercourse with the sick, even of the family of the person attacked.”*

Nothing can be more judicious than the other regulations published by the Board; but as the distinguished individuals composing it, deserved-

* Report of the Board of Health, p. 36.

ly high as they stand in the public estimation, have never personally witnessed the disease, and have, consequently, been under the necessity of forming their opinions on the reports of others, it is hoped that the writer's expression of dissent as to the necessity of the injunctions given in the particular clause above quoted, will not appear presumptuous. He only undertakes, of course, to narrate events that have fallen under his own observation ; and he is quite ready to allow that the strictest investigation on this point may still be necessary. It must also be admitted that, while a single doubt remains on the subject, the government is fully justified in taking every possible precaution to prevent the introduction of the malady into this country. Well remembering, however, that amongst the symptoms of the disease, was a remarkably acute sensibility of mind, which, for the most part, continued to the very last moment of existence ; and that the patient was, throughout, peculiarly susceptible of painful mental impressions, the author feels (with every deference to opinions emanating from such high authority) that he should be wanting in his duty to the public, if he were not, by thus stating his decided opinion as to the non-contagious nature of the Spasmodic Cholera, to endeavour to avert from the unfortunate sufferers the great calamity which, at such a period, the defection of friends might occasion.

THE PREDISPOSING AND EXCITING CAUSES OF CHOLERA.

It will not be necessary to go at any great length into this part of the subject, so many circumstances, which have a direct bearing on this point, having been already detailed in the foregoing part of this treatise. The author has already alluded to remarkable variations in the usual course of the seasons for some time previous to the appearance of the Cholera; and in describing its origin and progress, he has stated that it was generally preceded and accompanied by an easterly wind. It may, he thinks, therefore, be legitimately inferred, that unusual vicissitudes of the weather, and particularly from heat to cold and from dry to moist, accompanied by east or south-east winds, acted very influentially as predisposing and exciting causes of this Epidemic—a conclusion that is rendered further probable, from observing that a change in the direction of the wind to north or north-west, always had a salutary effect on those labouring under the disease, and not unfrequently put a check to its further progress.

These vicissitudes, however, may be considered as affecting, in a more peculiar manner, great bodies of people, and particular districts of

country. In noticing the predisposing causes which acted more especially on individuals—debility, from whatever cause it might arise, excessive fatigue in the heat of the sun, and sudden exposure to cold and moisture, may be pointed out as some of the most powerful. And among the circumstances most strongly predisposing to the disease, may be enumerated food of a poor, crude, and unsubstantial nature, scanty clothing, bad lodging, want of personal cleanliness, and, in fact, all the usual accompaniments of extreme poverty and wretchedness.

It was observed, in India, that the Hindoos, who are of penurious habits, and whose religion restricts them, in a great measure, to a vegetable and acescent diet, were more subject to the disease than either Mahometans or Europeans, who are accustomed to animal food; and, of the latter, the higher classes, and those who were well fed, well clothed, and in the enjoyment of the comforts of life, were in a great degree, though not altogether, exempted from its attacks.

Habits of dissipation, and irregularity of living were also found strongly to predispose individuals to its attack; as did also any unusual exertion, or any fatigue that induced the sensation of exhaustion. Among the exciting causes, one of the most frequent and most baneful, was sleeping unsheltered on the ground, or on the roofs of houses, which is common in India; or expo-

sure to the cold and chilling breeze that generally sets in just before sun-rise. Soldiers on night-duties, where they had to stand for a great length of time exposed to the dews and the cold night-air, were great sufferers.

To the above exciting causes may be added, the drinking of cold fluids while preternaturally heated, long fasting, or eating voraciously when the stomach had been long empty. Thus, during the great annual fast of the Ramzan, in which it is unlawful for Mahometans to eat while the sun is above the horizon, a much larger proportion of persons of that religion suffered, than of the Hindoos, who were not similarly restricted as to the times of their meals. Sudden exposure to cold, by going from a heated room into the cold air, or standing, while thinly clothed, in the evening or at night, at an open window, was found to be attended with great risk. Taking a very powerful dose of opening medicine sometimes acted as the immediate exciting cause; as did also errors in diet, or taking into the stomach any article of food not easy of digestion. In short, every thing that had a tendency to induce debility, or suddenly to repel the circulation from the vessels of the surface of the body, or to occasion indigestion, and, likewise, all the depressing passions, were found to render persons exceedingly liable to attacks of Cholera.

After this account of the predisposing and

exciting causes of this disorder, and after the demonstration that has been given in the preceding section in proof of its not being of a contagious nature, it will be obvious that the best, and indeed the only means of guarding against its attack, is, carefully to avoid the circumstances and conditions mentioned above; and it is equally obvious that the most judicious prophylactic means are those, which are almost universally known to have a tendency, at all times and in all situations, to preserve the general health.

In addition to what has been here pointed out, little more is necessary to be said on the score of precaution; but as it is impossible to press too strongly the necessity of using every means of defence against such a dangerous disorder, a few rules for popular use shall, at the hazard of being thought guilty of repetition, be here inserted, the strict observance of which would be found essentially to contribute to individual and general safety, and probably to disarm the disease, in the event of its approach, of a considerable portion of its virulence.

1st. To observe great personal cleanliness, and to wear flannel, or some other clothing of a similar texture, next the skin.

2nd. To be very careful in respect to diet, as to quantity and quality, using rather a large proportion of animal food; and where a vege-

table diet is principally adopted, either from choice or necessity, to take great care that the different articles are thoroughly boiled.

3rd. To avoid raw vegetables altogether, such as cucumbers, &c.; and to be sparing in the use of fruit.

4th. At all times carefully to avoid excess in eating, but more especially after a long fast, or after great bodily fatigue.

5th. To abstain from the immoderate use of spirituous liquors, and also from sour or adulterated beer; and from all habits of dissipation and irregularity of living.

6th. As far as possible to avoid any unusual exertion, or such long continued fatigue as may induce the sensation of exhaustion.

7th. To use a sufficient quantity of bed-clothes, and to avoid falling asleep while exposed to the chilling night-air.

8th. To avoid drinking cold fluids while preternaturally heated.

9th. To avoid sudden exposure to cold by going from a heated room into a cold atmosphere, particularly into the damp night-air; or exposure to the latter while too slightly clothed.

10th. Powerful medicine should not be had recourse to, during the prevalence of Cholera, without medical advice.

The above rules may be considered as peculiarly applicable to individuals; but there are

others adapted to large masses of people, especially to large and populous towns, and to those districts of London and other cities, in which the inhabitants are most densely crowded together. It is therefore recommended,

11th. That those quarters of the town above alluded to, should be visited by competent persons, whose duty it should be to direct that every sort of filth and dirt be, without delay, removed from the immediate vicinity of dwelling-houses.

12th. To ascertain the general state of the drains, &c. and to have the requisite repairs done to such as, from their dilapidated condition, have become noxious and offensive; and also to direct that all shallow, stagnant, and unwholesome puddles of water, situated close to inhabited houses, and which have become offensive by the decomposition of leaves and other vegetable matter, be filled up or drained.

13th. That the houses of the poor, in crowded districts, be thoroughly cleaned, and the walls hot lime-washed; and that every possible degree of cleanliness and ventilation be recommended to be observed by the respective occupiers.

TREATMENT OF THE DISEASE.

THE author has endeavoured, while delineating the symptoms of Cholera, to state, as clearly as possible, the usual course and order of succession of the phenomena attending this disease. Of the importance of accurately describing them, he is fully aware, not merely for the purpose of establishing its diagnosis, but for that also of explaining the principles of treatment which he thought it right to adopt, and which, as may be seen by referring to the Tables in the introductory part of this Essay, were attended, even under very unfavourable circumstances, with remarkable success.

He purposes, in the first place, to enter into a detail of the means which, in his own private and public practice, were found most efficacious. But, adhering to the principles of *utility* on which he set out, he will not fail to collect from the observations of others, and, especially, from those documents which comprise the experience of a considerable portion of the medical staff, such facts as he may deem important: particularly where the practice, in parts of the country at a great distance from the sphere of his own observations, and varying con-

siderably both in climate and other circumstances, differed in any respect from that which he found successful in Calcutta and its vicinity.

In the first place, it cannot fail to have been remarked that this disease was almost invariably ushered in by symptoms of great depression and diminution of the vital powers, coldness of the surface, impeded action of the heart, and a state of general collapse. The primary and most pressing indication, therefore, was to assist Nature in making a rally, and, by endeavouring to restore the action of the heart and arteries, to uphold her from sinking under the effects of the first violent shock.

To effect these ends, it was the practice of the writer to have ready, at all the hospitals and receiving houses under his medical charge, a great number of hot blankets, heated bricks, or bags of sand, or of salt, or bran; or, what was still more convenient, a number of small rounded stones, formed somewhat like a rolling-pin, which are used by the natives for bruising their curry stuff: one of these, made quite hot, was wrapped in a piece of coarse flannel, or country blanket, and applied to the sole of each foot, to the palms of the hands, and one to each arm-pit of the patient; and a bag of heated bran, salt, or sand, or a piece of blanket, made as hot as possible, was, at the same time, placed on the re-

gion of the stomach and abdomen. While some of the assistants were placing these, others were indefatigable in using very brisk friction to every part of the trunk and extremities, with embrocations of camphorated oil, volatile linament, turpentine, or some of these mixed with cajeput oil and other stimulants.

No time was lost in giving the patient a dose of laudanum and sulphuric æther, varying in strength according to circumstances, but on an average about fifty drops of laudanum, and a drachm or sixty drops of æther. These were administered in two table-spoonfuls of strong, hot brandy and water; and if this was rejected, which happened in the majority of cases, it was immediately repeated, and a similar dose was given about every fifteen or twenty minutes, according to the urgency of the symptoms; or a pill consisting of from one to three grains of opium alone, or combined,—sometimes with five or six grains of carbonate of ammonia,—at others with a like quantity of Cayenne pepper, was substituted; and this was followed by one or two table-spoonfuls of brandy alone, or hot negus, or hot brandy and water, or mulled port-wine.

These diffusible stimuli were, however, varied in every possible manner, depending sometimes on what seemed to remain longest without being rejected, and at others on what

happened to be nearest at hand; for it may be safely laid down as an axiom in this disease, that the success of the treatment, in this stage of it, depends much less on the *kind* of stimuli and restoratives made use of, than on the *promptness* with which they are had recourse to. Sometimes brandy alone appeared to be most effectual; sometimes rum, either singly or made into punch; at other times volatile alkali, (spirits of sal-volatile,) or some of the warm essential oils, in doses of about twenty drops; and in a case that came under the author's care, a gentleman of the civil service, who was reduced by all the aggravated symptoms of the disease to a hopeless state, after every other remedy had failed, was restored by taking frequent draughts of bottled ale; after drinking the first wine-glass-full of which, the irritability of the stomach, and all the most distressing symptoms, began instantly to subside. But in numerous other instances, in which this remedy was afterwards tried, it proved of no avail.

In a great many cases, where the attack had not been very severe, where the spasmodic affection was slight, or had not occurred at all; and where the internal burning heat was moderate, the means above mentioned frequently proved sufficient, both to allay the disturbance of the stomach and bowels, and so far to restore the circulation as to reproduce the warmth of

the surface of the body, and to cause the pulse at the wrist and temples to become plainly perceptible. When this was the case, the patient generally fell asleep, and, on awaking, made no other complaint than that of excessive thirst, and slight uneasiness about the region of the stomach, which subsided, in general spontaneously, on the patient having a copious bilious motion.

At this stage, as indeed throughout the whole course of the disease, it was of the greatest importance to prevent him from taking cold drinks of any kind ; but so great was his impatience for these, and so earnestly did he implore to be indulged in this respect, that it required great firmness on the part of the friends and attendants, to withhold them. The only refreshment of that nature that could be safely allowed, was, tepid congee or rice-gruel, given in very small quantities, not exceeding a table-spoonful at a time.

In the favourable cases, above described, nothing was now necessary but to give a gentle dose of one of the following aperients, *viz.* castor-oil, or rhubarb and magnesia, or compound powder of jalap, or sometimes even a small dose of sulphate of magnesia (Epsom salts ;) and it was usual to add to any of these either peppermint or the compound tincture of lavender, cardamoms or cinnamon. Above all, however, it was

necessary carefully to avoid *all* the exciting causes before alluded to.

But, in too many cases, the disease proved far more severe and intractable. The symptoms of congestion about the centre were more manifested by the heat felt externally about the pit of the stomach, and by the sensation of oppression and intolerable burning that the patient referred to that region. The distress of the sufferer was also greatly augmented by the spasmodic action of the abdominal muscles, and of those of the extremities, and more especially of the calves of the legs, (the gastrocnemii.) Where these symptoms prevailed to a violent degree, the remedies above mentioned proved, too frequently, unavailing: in fact, from the incessant vomiting, none of them would remain an instant on the stomach.

Under these circumstances, attempts were made in a great many cases to bleed, but it rarely happened that more than a few drops of blood of a black appearance, and of a very thick consistence, could be obtained. The author was, however, anxious, from the representations he had received of the good effects of that measure in some of the upper provinces, and among the more robust inhabitants of Hindostan, to give venesection a full and fair trial. But whatever success had attended the practice elsewhere, he was obliged to come to the conclusion, that it

was not adapted to the native, nor, indeed, in general, to the European residents of the lower provinces of Bengal. He has the authority of the Bengal Report for saying, that it was tried with various success in different parts of the country; and the following quotation from that document will show that, in certain situations, it was attended with the best effects. Speaking of the troops encamped in the upper provinces, it observes: "In Europeans, bleeding could commonly be practised where the patient was seen within one or two hours from the beginning of the attack, and, where it was resorted to under such favourable circumstances, it was more successful than any other remedy in cutting short the disease—usually resolving spasm, allaying the irritability of the stomach, and removing the universal depression under which the system laboured. But, among the generality of the natives, the depressing influence of the disease was so powerful and rapid in its operation, as almost immediately to produce complete collapse and nearly destroy arterial action, and therefore to render venesection, for the most part, from the beginning, impracticable."*

The writer now returns to the account of his own practice. In violent cases, which refused to yield to the diffusible stimuli and the restora-

* Beng. Rep. p. 247.

tive plan above mentioned, and where he had failed in obtaining blood by venesection, (which latter remedy, however, he ultimately laid aside as either fruitless or prejudicial,) while he continued unremitting in his endeavours to restore the circulation by means of the external applications already mentioned, and of hot fomentations to the region of the stomach and liver, he now gave a dose of calomel, sometimes as much as half a drachm, but, more commonly, twenty grains; and, if this were immediately rejected, he repeated the dose, in combination with two or three grains of opium, and if these remained, he gave a similar dose at the expiration of about every two or three hours, till the most distressing symptoms had subsided. That the exhibition of these immense doses of calomel was often attended with the happiest effect in suspending the inordinate action of the stomach and bowels, there can be no doubt; and the author thinks that, in many cases where it failed of doing good, the failure arose from its being administered too soon, *viz.* before the means requisite to restore the action of the heart, and to remove the torpor and coldness of the surface and extremities, had been sufficiently long persevered in: he could never depend on its good effects when given before the collapse, brought on by the first shock of the disease, had been in some degree overcome. But when this stage was waited for, it

often appeared to act like a charm, and succeeded more frequently than any other single remedy.

The successful result of the exhibition of this medicine does certainly induce the writer to believe, that he is not altogether mistaken in the view he has taken, and the conjecture he has hazarded respecting the proximate cause of the disease. Whether, however, the remedy now noticed, acts directly on the stomach, or indirectly on this viscus and the intestines through its influence on the liver, he will not presume to decide, though he strongly inclines to the latter opinion; and, by invariably observing that, where calomel had been freely employed, feculent and bilious motions (the only indication of safety to the patient) were much sooner procured than in cases where it had not been had recourse to, he is led to presume that this medicine acts directly and specifically upon the liver, tending to emulge the biliary ducts, and thereby to relieve the congestion of this organ.

He cannot close his remarks on the exhibition of calomel, without, however, again forcing upon the attention of the practitioner the paramount importance of unceasing endeavours to restore the warmth of the surface and extremities; and where other means have failed to effect this, he has, on some occasions, had recourse to the sudden affusion of boiling water on the pit of the

stomach, on others, to spreading on that region a small quantity of tow soaked with turpentine, and then setting it on fire: the sudden excitement occasioned by which means has often proved very beneficial. Blisters were found to be too tedious in their operation, and the use of them was soon abandoned: mustard poultices were found more efficacious. The warm-bath would naturally present itself, as a remedy peculiarly useful in this disease: in the hospitals and receiving-houses, however, so numerous were the cases, and so incessantly did they pour in, that its general or frequent use was quite impossible. In private practice it was repeatedly tried, but without producing permanent good effect: on the contrary, the fatigue incident to this operation, and the faintness that often occurred from submersion of the body in hot water, seemed rather to accelerate the fatal event. Anodyne injections were of doubtful use, and their salutary effect not to be depended on.

In the most severe and protracted cases, where, by any of the means above described, the urgent symptoms had at length been subdued, the after-treatment became precisely the same as in cases of the most favourable nature, except that still greater vigilance, and still more precaution, on the part of the patient and his attendants, became necessary; and that, to the occasional employment of mild aperients, might be advan-

tageously added the use of light bitter infusions, chalybeates, and such other remedies as have a tendency to restore the tone of the stomach, and to strengthen the general system.

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